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NOTES ON GEOGRAPHIC DISTRIBUTION

Hemiptera, Coccoidea: Distribution extension and new records for the states of Espírito Santo, Ceará, and Pernambuco, Brazil

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ABSTRACT: New host plant and geographic distribution records are presented for 22 scale insect species of six families collected in the Brazilian states of Espírito Santo, Ceará, and Pernambuco during 2006 to 2009. Nine species, *Aclerda takahashii* Kuwana, 1932, *Ceroplastes cirripediformis* Comstock, 1881, *C. acutus* Peronti, 2008, *C. stellifer* (Westwood, 1871), *Howardia biclavis* (Comstock, 1883), *Insignorthezia insignis* (Browne, 1887), *Dysmicoccus texensis* (Tinsley, 1900), *Nipaecoccus* cf. *nipae*, and *Planococcus halli* Ezzat, 1962, are registered for the first time in Espírito Santo, and this is the initial record of Aclerdidae in this state.

Scale insects (Hemiptera: Coccoidea) are common throughout the world and they often cause damage to plants by feeding on their sap (Miller *et al.* 2005). There are about 7,500 described scale insect species (Ben-Dov *et al.* 2009) but relatively few (~ 60) are known to occur in Espírito Santo, Brazil (Culik *et al.* 2007; Culik *et al.* 2008), although this State contains some of the most biologically diverse forests (Atlantic Rain Forest) in the world (Mori 1989; Thomaz and Monteiro 1997). Agriculture is also an important part of the State's economy with many small, family farmers dependent on agriculture for their income. Preservation of biodiversity and development of sustainable agriculture, based on ecologically informed practices such as integrated pest management (IPM), in Espírito Santo and similar areas depends on accurate knowledge of the actual biological diversity (pest and beneficial insects, for example) present in such areas (Valdecasas and Camacho 2003). Therefore, because increased information on the insect fauna of Espírito Santo and similar areas is needed for preservation of biodiversity and sustainable development, scale insects and their natural enemies were collected during 2006 to 2009 from various plants in Espírito Santo, Ceará, and Pernambuco, Brazil, to identify the species present in these States. In this note we document new scale insect records for Espírito Santo, Ceará, and Pernambuco based on this research to add to the limited information available on the scale insect fauna of these areas, as well as contribute to a more complete knowledge of scale insect biogeography and host plant relationships in general.

Scale insects and their natural enemies were collected during surveys of the insect fauna of pineapple, *Ananas comosus* (L.) Merr., 1917, var. *comosus* (Bromeliaceae), and when noticed on other plants during fieldwork or other activities in Espírito Santo in 2006 to 2008. Samples of plant parts (fruits, leaves, stems) infested with scale insects were collected from locations ranging from municipalities of Serra in the north (20°7'48" S, 40°18'36" W) to Anchieta in the south (20°48'35" S, 40°38'59" W) and Vitória (20°19'12" S, 40°21'0" W), on the coast, to municipalities in the interior of the state such as Domingos Martins (20°22'48" S, 41°2'59" W), from a variety of sites including experimental research plots, residences, and greenhouses. One sample was also collected from *Carica papaya* L., 1753 (Caricaceae) in Ceará in 2006 and from *Vitis vinifera* L., 1758 (Vitaceae) in Pernambuco in 2009. Samples were transported to the Espírito Santo rural research and extension institute INCAPER (Instituto Capixaba de Pesquisa, Assistência Técnica e Extensão Rural) headquarters in Vitória for photographing and preservation of the insects collected and scale insect specimens were slide-mounted for identification using standard methods (permanent slides of adult females were prepared using 10 % sodium hydroxide for clearing, dehydration in alcohol, and Canada balsam mounting medium). Keys to species including Williams and Granara de Willink (1992) and Miller *et al.* (2007) were used to identify the specimens. Voucher specimens of these insects are deposited in the arthropod collections of INCAPER, Vitória, Espírito Santo, the Museu de Entomologia Professor Ramiro Gomes Costa, Fundação Estadual de Pesquisa Agropecuária FEPAGRO, Porto Alegre, Rio Grande do Sul, and the Coleção Entomológica do Departamento de Ecologia e Biologia Evolutiva, Universidade Federal de São Carlos – UFSCar, São Paulo, Brazil.

Based on this research, host plant and geographic distribution extensions are presented for 22 scale insect species of six families collected in Espírito Santo, Ceará, and Pernambuco during 2006 to 2009 (Table 1). Nine species, *Aclerda takahashii* Kuwana, 1932, *Ceroplastes*

cirripediformis Comstock, 1881, *C. acutus* Peronti, 2008, *C. stellifer* (Westwood, 1871), *Howardia biclavis* (Comstock, 1883), *Insignorthezia insignis* (Browne, 1887), *Dysmicoccus texensis* (Tinsley, 1900), *Nipaecoccus* cf. *nipae*, and *Planococcus halli* Ezzat, 1962, are registered for the first time in Espírito Santo, and this is also the initial record of the scale insect family Aclerdidae in this State. Nine species, *Aonidiella comperei* McKenzie, 1937, *Hemiberlesia palmae* (Cockerell, 1893), *Melanaspis smilacis* (Comstock, 1883), *Pseudaulacaspis pentagona* (Targioni Tozzetti, 1886), *Unaspis citri* (Comstock, 1881), *Dysmicoccus brevipes* (Cockerell, 1893), *Ferrisia virgata* (Cockerell, 1893), *Planococcus minor* (Maskell, 1897), and an undetermined species of Monophlebidae, are documented for the first time in different municipalities in Espírito Santo. And, new host plants are recorded for five scale insect species: *Ceroplastes acutus* on *Psidium* sp. (Myrtaceae), *Aspidiotus destructor* Signoret, 1869 on *Clusia* sp. (Clusicaeae), a species of Ortheziidae, *Praelongorthezia* cf. *praelonga*, on *Jatropha curcas* L., 1753 (Euphorbiaceae), *Phenacoccus solenopsis* Tinsley, 1898 on *Capsicum annuum* L., 1753 (Solanaceae) and *Vitis vinifera* (Vitaceae), and *Dysmicoccus texensis* on *Ananas comosus* (Bromeliaceae), *Annona* sp. (Annonaceae), *Cocos nucifera* L., 1753 (Palmae), *Coffea canephora,* Pierre ex Froehner, 1897 (Rubiaceae), and *Cucurbita pepo* L., 1753 (Curcubitaceae). In addition, this is the initial register of *Phenacoccus solenopsis* (Pseudococcidae) in the States of Ceará and Pernambuco, Brazil.

Most of the scale insect species collected in this study are polyphagous and widely distributed (Ben-Dov *et al.* 2009). Thus, they are potential pests of numerous agricultural crops in many tropical areas. However, natural enemies of many of these scale insects were also commonly found associated with these scale insects in Espírito Santo (Table 1), including several new species of predatory insects recently and in the process of being described (Culik and Ventura 2009), indicating the importance of using integrated pest management (IPM) methods, and avoiding ecologically disruptive practices such as improper use of pesticides, to prevent destruction of beneficial insects and natural enemies of scale insects that may commonly help control scale insect and other pests in this and similar areas.

A scale insect species that is similar to *Phenacoccus solenopsis* in appearance may be a pest of cotton in Ceará (Bastos *et al.* 2007). Therefore, the records of *P. solenopsis* in Ceará and Pernambuco are also of significance because this species has not previously been identified from those States and these records confirm that this potential pest is more widely distributed in Brazil than has previously been recognized (Culik and Gullan 2005).

Table 1. Host plant and geographic distribution extensions of scale insects (Hemiptera: Coccoidea) collected in the states of Espírito Santo (ES), Ceará (CE), and Pernambuco (PE), Brazil (2006-2009).
[a] Brazilian State and Federal District abbreviations: Amazonas (AM), Bahia (BA), Ceará (CE), Distrito Federal (DF), Espírito Santo (ES), Mato Grosso (MT), Minas Gerais (MG), Paraná (PR), Pernambuco (PE), Rio Grande do Norte (RN), Rio Grande do Sul (RS), Rio de Janeiro (RJ), Santa Catarina (SC), São Paulo (SP), Sergipe (SE).
[b] Associated natural enemies (insect parasitoids and predators) also collected.

TAXON	COLLECTION MUNICIPALITY, STATE	ASSOCIATED HOST PLANT	NOTE (PREVIOUS KNOWN DISTRIBUTION IN BRAZIL)[A]
ACLERDIDAE			
Aclerda takahashii Kuwana, 1932[b]	Serra, ES	Poaceae: *Saccharum officinarum* L., 1753	Initial register in ES (SP)
COCCIDAE			
Ceroplastes cirripediformis Comstock, 1881	Domingos Martins, ES	Passifloraceae: *Passiflora edulis* Sims, 1818	Initial register in ES (SP)
Ceroplastes acutus Peronti, 2008	Serra, ES	Myrtaceae: *Psidium* sp.	Initial register in ES, new host plant record (SP)
Ceroplastes stellifer (Westwood, 1871)[b]	Vitória, ES	Araliaceae: *Schefflera* sp., leaf	Initial register in ES (PE, RJ, RS, SP)
DIASPIDIDAE			
Aonidiella comperei McKenzie, 1937	Cariacica, ES	Rubiaceae: *Morinda citrifolia* L., 1753	Initial register in municipality, ES (RN)
Aspidiotus destructor Signoret, 1869	Vitória, ES	Clusiaceae: *Clusia* sp., leaf	New host plant record (BA, DF, ES, RJ, SE, SP)
Hemiberlesia palmae (Cockerell, 1893)[b]	Domingos Martins, ES	Palmae	Initial register in municipality, ES (ES)
Howardia biclavis (Comstock, 1883)	Vitória, ES	unidentified onamental, leaf	Initial register in ES (BA, MG, RJ, SP)
Melanaspis smilacis (Comstock, 1883)[b]	Domingos Martins, ES	Bromeliaceae: *Ananas comosus* (L.) Merr., 1917, var. *comosus*, leaf	Initial register in municipality, ES (ES)
Pseudaulacaspis pentagona (Targioni Tozzetti, 1886)[b]	Domingos Martins, ES	Rosaceae: *Prunus persica* (L.) Batsch, 1801	Initial register in municipality, ES (ES, PE, RS, SP)
Unaspis citri (Comstock, 1881)	Domingos Martins, ES	Rutaceae: *Citrus* sp.	Initial register in municipality, ES (ES, MT, RS, RJ, SP)

TAXON	COLLECTION MUNICIPALITY, STATE	ASSOCIATED HOST PLANT	NOTE (PREVIOUS KNOWN DISTRIBUTION IN BRAZIL)[A]
MONOPHLEBIDAE			
Monophlebidae	Anchieta, ES	Moraceae: *Artocarpus heterophyllus* Lam., 1789, fruit	Initial register in municipality, ES
ORTHEZIIDAE			
Insignorthezia insignis (Browne, 1887)	Serra, ES	Labiatae: *Coleus* sp.	Initial register in ES (RS)
Praelongorthezia cf. *praelonga*	Vitória, ES	Euphorbiaceae: *Jatropha curcas* L., 1753	New host plant record
PSEUDOCOCCIDAE			
Dysmicoccus brevipes (Cockerell, 1893)[b]	Domingos Martins, ES	Bromeliaceae: *Ananas comosus* var. *comosus,*	Initial register in municipality, ES (BA, ES, MG, MT, PE, PR, RS, SC, SP)
	Serra, ES	Palmae: *Cocos nucifera* L., 1753, fruits	New host plant record in ES
Dysmicoccus texensis (Tinsley, 1900)[b]	Domingos Martins, ES	Bromeliaceae: *Ananas comosus*	Initial register in ES, new host plant record (MG)
	Linhares, ES	Rubiaceae: *Coffea canephora* Pierre ex Froehner, 1897, berries	New host plant record
	Jaguaré, ES	Rubiaceae: *Coffea canephora*	New host plant record
	Serra, ES	Cucurbitaceae:*Cucurbita pepo* L., 1753, fruit	New host plant record
	Serra, ES	Palmae: *Cocos nucifera*, fruits	New host plant record
	Vitória, ES	Annonaceae:*Annona* sp., fruit	New host plant record
Ferrisia virgata (Cockerell, 1893)[b]	Jaguaré, ES	Rubiaceae: *Coffea canephora*	Initial register in municipality, ES; new host plant record in ES (AM, ES)
Nipaecoccus cf. *nipae*[b]	Vitória, ES	Myrtaceae: *Psidium guajava* L., 1753, leaf	Initial register in ES
Phenacoccus madeirensis Green, 1923	Serra, ES	Solanaceae: *Capsicum annuum* L., 1753	New host plant record in ES (BA, ES, MG, RJ, SP)
Phenacoccus solenopsis Tinsley, 1898	Serra, ES	Solanaceae: *Capsicum annuum*	New host plant Record (ES)
	Acaraú,CE	Caricaceae: *Carica papaya* L., 1753	Initial register in CE
	Lagoa Grande, PE	Vitaceae: *Vitis vinifera* L., 1758	Initial register in PE, new host plant record
Planococcus halli Ezzat, 1962[b]	Colatina, ES	Rubiaceae: *Coffea canephora*, roots	Initial register in ES (previous distribution in Brazil unknown)
	Venda Nova, ES	Rubiaceae: *Coffea arabica* L., 1753, roots	New host plant record
	Vitória, ES	Araceae: *Spathiphyllum* sp.	New host plant record
	Vitória, ES	Myrtaceae: *Syzygium jambos* (L.) Alston, 1931	New host plant record
Planococcus minor (Maskell, 1897)[b]	Vitória, ES	Myrtaceae: *Syzygium jambos*	Initial register in municipality, ES; new host plant record in ES (AM, ES)

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Literature Cited

Bastos, C.S., R.P. de Almeida, F.C.V. Neto and G.P. de Araújo. 2007. Ocorrência de *Planococcus minor* Maskell (Hemiptera: Pseudococcidae) em algodoeiro no Nordeste do Brasil. *Neotropical Entomology* 36: 625-628.

Ben-Dov, Y., D.R. Miller and G.A.P. Gibson. 2009. *ScaleNet. USDA, Beltsville, USA*. Electronic Database accessible at: http://www.sel.barc.usda.gov/scalenet/scalenet.htm. Captured on 1 February 2009.

Culik, M.P. and P.J. Gullan. 2005. A new pest of tomato and other records of mealybugs (Hemiptera: Pseudococcidae) from Espírito Santo, Brazil. *Zootaxa* 964: 1-8.

Culik, M.P. and J.A. Ventura. 2009. New species of *Rhinoleucophenga*, a potential predator of pineapple mealybugs. *Pesquisa Agropecuária Brasileira* 44: 417-420.

Culik, M.P., D.S. Martins, J.A. Ventura and V.S. Wolff. 2008. Diaspididae (Hemiptera: Coccoidea) of Espírito Santo, Brazil. *Journal of Insect Science* 8(17): 1-6.

Culik, M.P., D.S. Martins, J.A. Ventura, A.B.G. Peronti, P.J. Gullan and T. Kondo. 2007. Coccidae, Pseudococcidae, Ortheziidae, and Monophlebidae (Hemiptera: Coccoidea) of Espírito Santo, Brazil. *Biota Neotropica* 7: 61-65.

Miller, D.R., G.L. Miller, G.S. Hodges and J.A. Davidson. 2005. Introduced scale insects (Hemiptera: Coccoidea) of the United States and their impact on U.S. agriculture. *Proceedings of the Entomological Society of Washington* 107: 123-158.

Miller, D.R., A. Rung, G.L. Venable, R.J. Gill, and D.J. Williams. 2007. *Scale Insects. Washington: USDA.*

Electronic Database accessible at: http://www.sel.barc.usda.gov/ScaleKeys/ScaleInsectsHome/ScaleInsectsHome.html. Captured on 1 February 2009

Mori, S.A. 1989. Eastern, Extra-Amazonian Brazil; p. 427-454 *In* D.G. Campbell and H.D. Hammond (ed.). *Floristic inventory of tropical countries: the status of plant systematics, collections, and vegetation, plus recommendations for the future*. New York: New York Botanical

Garden.
Thomaz, L.D. and R. Monteiro. 1997. Composição florística da Mata Atlântica de encosta da Estação Biológica de Santa Lúcia, município de Santa Teresa - ES. *Boletim do Museu de Biologia Mello Leitão* 7: 3-48.
Valdecasas, A.G. and A.I. Camacho. 2003. Conservation to the rescue of taxonomy. *Biodiversity and Conservation* 12: 61113-1117.
Williams, D.J. and M.C. Granara de Willink. 1992. *Mealybugs of Central and South America*. London: CAB International.

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